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GROUP 1700 #15

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of :  
Yoshiaki TOMOTAKE et al. : Docket No. 2000-1428A  
Serial No. 09/673,217 : Group Art Unit 1774  
Filed October 13, 2000 : Examiner L. Ferguson  
INK JET RECORDING PAPER :

\*\*\*\*\*

DECLARATION UNDER 37 CFR 1.132

I, Yoshiaki TOMOTAKE, declare as follows:

I am one of the inventors of the above-identified application and am fully familiar with the subject matter and facts set forth therein.

I hold a Bachelor's degree in Polymer Chemistry from the Chemistry Department of Faculty of Engineering of Gunma University, and a Master's degree in Polymer Chemistry from Gunma University Graduate School in 1994.

From the time of my completion of the Graduate School down to the present (about 9 years), I have been employed by Tokushu Paper MFG. Co., Ltd. and have been engaged in research and development in novel and improved paper.

In the last 5 years, I have been engaged especially in non-coated and coated ink jet recording paper, so I am well acquainted with the technical knowledge of ink jet recording paper.

I have conducted the following experiments to demonstrate that an ink jet recording paper having a high ink coloring density and a high ink absorption speed can be obtained by the present invention.

PREPARATION OF SAMPLES EMPLOYED

[SAMPLE 1] (Present Invention)

The paper prepared by "Example 7" described in the present application is used.

<u>Ingredients</u>	<u>wt. cont. (%)</u>
• Mercerized pulp	30
"SULFATATE HJ" (Rayonier Co. USA)	
• NBKP (not treated)	40
• LBKP (not treated)	30

Dry basis weight: 60 g/m<sup>2</sup>

[SAMPLE 2] (Present Invention)

The paper prepared by "Example 8" described in the present application is used.

<u>Ingredients</u>	<u>wt. cont. (%)</u>
• Mercerized pulp	45
"SULFATATE HJ" (Rayonier Co., USA)	
• NBKP (not treated)	35
• LBKP (not treated)	20

Dry basis weight: 60 g/m<sup>2</sup>

[COMPARATIVE SAMPLE 1] (US Patent 6,133,170)

Handmade paper was prepared in accordance substantially with "Example 9" of US Patent 6,133,170, except that bleached softwood kraft pulp was replaced by mercerized pulp.

<u>Ingredients</u>	<u>wt. cont. (%)</u>
• Curled fibers	60
"NHB416" (Weyerhaeuser Co., USA)	
• Mercerized pulp	20
"SULFATATE HJ" (Rayonier Co., USA)	
• Fine fibers (*)	20

Dry basis weight: 60 g/m<sup>2</sup>

Note: (\*) Commercially available fine fibers ("Mitsubishi LP-G (LBKP)", Mitsubishi Paper Mills Ltd., JPN) having an arithmetic-average fiber length of 0.24 mm (measured by KAJAANI fiber-length measuring apparatus, Type: FS-200) and water retention of 295 % (average of 4 samples) were used. With respect to bond-reinforcing factor of fine fibers, it is considered that a suitable value can be obtained when the arithmetic-average fiber length and the water retention are within the range specified in this US Patent.

[COMPARATIVE SAMPLE 2] (WO 99/00541)

A handmade wet cellulosic web was prepared in

accordance substantially with "Example" described on page 15, lines 9 - 11 of WO 99/00541, except that mercerized pulp was added in an amount of 30 wt.% of the entire fiber material similar to the above-mentioned SAMPLE 1 of the present invention.

<u>Ingredients</u>	<u>wt. cont. (%)</u>
• Northern softwood Kraft pulp	52.5
• "Cariboo NBKP" (Cariboo Co., CAN)	
• Southern softwood Kraft pulp	17.5
• "Harmac NBKP" (Harmac Pacific Co., CAN)	
• Mercerized pulp	30.0
• "SULFATATE HJ" (Rayonier Co., USA)	

Dry basis weight: 50 g/m<sup>2</sup>

The wet cellulosic web thus obtained was overlayed on a nonwoven web of spunbond polypropylene ("ELTAS P03025", Asahi Kasei Co., JPN; 25g/m<sup>2</sup>) to form a substrate of the cellulosic web overlayed on the nonwoven web. In this experiment, hydroentangling using water jet was not conducted.

The substrate was then saturated with the following latex saturant, the composition of which is substantially similar to that of Latex Saturant A of Table 1 on pages 15 - 16.

	% Solids	<u>Parts</u>	
		<u>Dry</u>	<u>Wet</u>
• Self-crossing ethylene-vinyl acetate copolymer latex saturant or binder ("Sumikaflex 752", Sumitomo Chemicals Co., JPN)	50	50	100
• Water	-	-	160
• Cationic amine polymer-epichlorohydrin adduct ("U-Ramin P", Mitsui Chemicals Co., JPN)	31	13.3	43
• Ammonia	29	0.5	1.8
• Final saturant composition	21	64	305

#### MEASUREMENT OF LIQUID TRANSFER LENGTH BY BRISTOW'S METHOD

Liquid transfer length of SAMPLES 1 and 2 and COMPARATIVE SAMPLES 1 and 2 were measured by Bristow's method described on pages 13 -14 of the present specification at the moving speed of 5.0 mm/sec.

	<u>Liquid transfer length (mm)</u>
SAMPLE 1	46
SAMPLE 2	35
COMP.SAMPLE 1	22
COMP.SAMPLE 2	110

#### EVALUATION FOR COLORING DENSITY

SAMPLES 1 and 2 and COMPARATIVE SAMPLES 1 and 2 were

applied with solid printing by each of mono-color inks of cyan, magenta and yellow ("BC1-21 Color", Canon Inc.) and black ("BC1-Black", Canon Inc.), respectively, by using an ink jet printer ("BJF200", Canon Inc. ). The results of measuring the coloring density using a densitometer ("Model No. 1255", Macbeth Co.) are shown in the following table.

	<u>Cyan</u>	<u>Magenta</u>	<u>Yellow</u>	<u>Black</u>
SAMPLE 1	1.22	1.26	1.17	1.26
SAMPLE 2	1.23	1.29	1.19	1.28
COMP.SAMPLE 1	1.10	1.16	1.09	1.18
COMP.SAMPLE 2	0.86	0.98	0.88	0.91

These four samples applied with solid printing are attached hereto.

#### DISCUSSION AND CONCLUSION

(a) SAMPLES 1 and 2 and COMPARATIVE SAMPLE 1 show liquid transfer length of 100 mm or less in Bristow's method. However, SAMPLES 1 and 2 of the present invention are improved with the coloring density compared with COMPARATIVE SAMPLES 1 and 2, although the substantially similar amount of mercerized pulp is used in these four samples.

(b) The use of curled fibers (as in US Patent 6,133,170) produces low density paper unsuitable for ink jet recording paper in which ink feathering may occur due to the coarse

fiber structure in paper.

(c) The impregnation of latex (as in WO 99/00541) produces paper in which ink absorption is inhibited and nonuniformity in coloring of ink may occur.

(d) COMPARATIVE SAMPLE 1 has relatively rough surfaces. When a high speed ink jet printing is carried out, paper feeding is hindered by the roughness of paper and printing is frequently discontinued.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated this 23<sup>rd</sup> day of April, 2003

*Yoshiaki Tomotake*

Yoshiaki TOMOTAKE

SAMPLE 1 (Present Invention)

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第7

電熱構長酸右流磨



1.18

1.09

1.16

1.10



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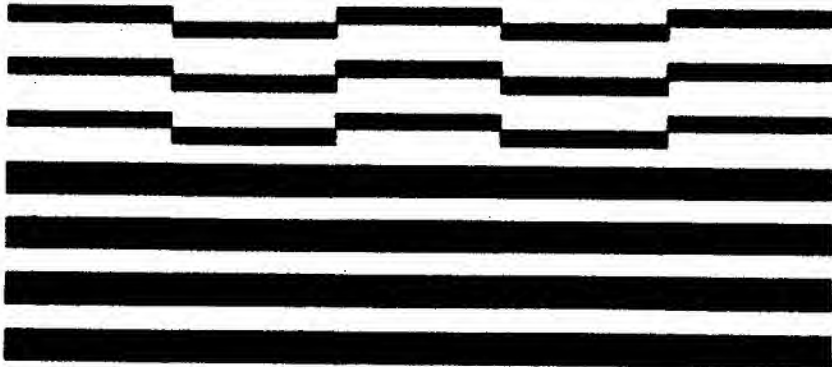
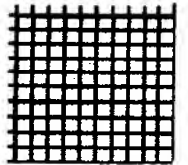
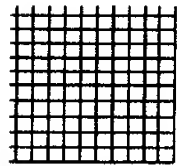
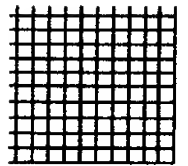
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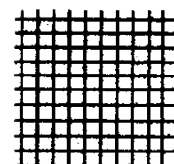
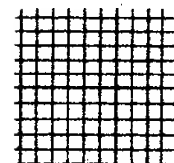
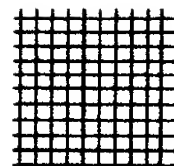
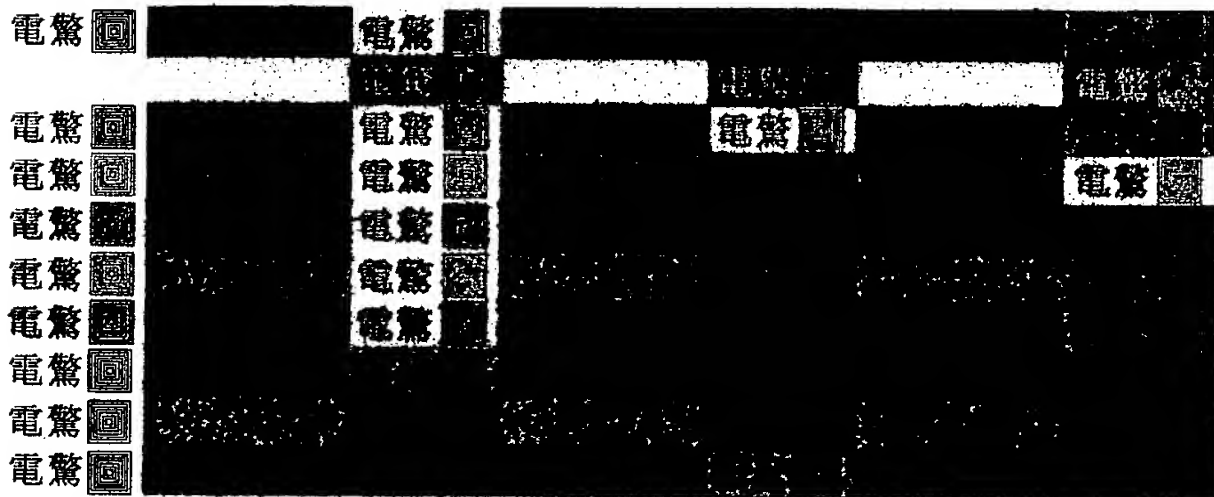
COMPARATIVE SAMPLE 1 (USP 6133170)

0.91

0.88

0.98

0.86



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COMPARATIVE SAMPLE 2 (WO 99/00541)

1.28

1.19

1.29

1.23



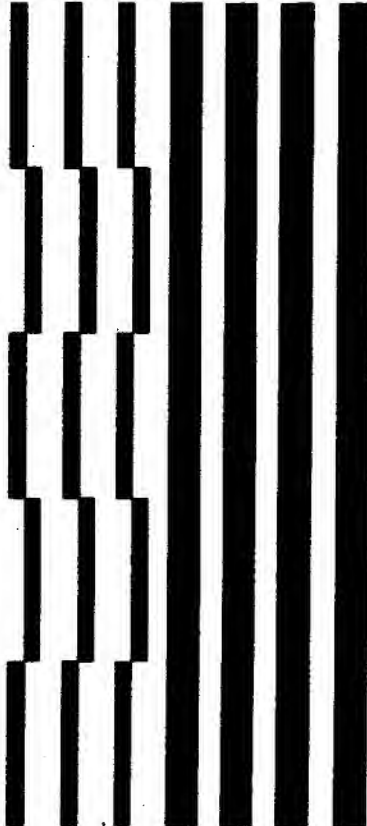
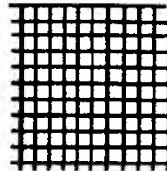
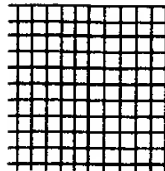
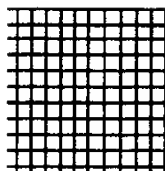
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N-Paper-桌8

SAMPLE 2 (Present Invention)